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8/9,K/9 (Item 2 from file: 349)
DIALOG(R)File 349:PCT FULLTEXT
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00852844 **Image available**

6 | SYSTEM AND METHOD FOR GENERATING A MULTI-DIMENSIONAL CALENDAR OBJECT IN
REAL-TIME

SYSTEME ET PROCEDE PERMETTANT DE GENERER UN OBJET DE CALENDRIER
MULTIDIMENSIONNEL EN TEMPS REEL

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Patent and Priority Information (Country, Number, Date):

Patent: WO 200186481 A2 20011115 (WO 0186481)

Application: WO 2001US14663 20010504 (PCT/WO US0114663)

Priority Application: US 2000565421 20000505

Designated States:

(Protection type is "patent" unless otherwise stated - for applications
prior to 2004)

AE AG AL AM AT AU AZ BA BB BG BR BY BZ CA CH CN CR CU CZ DE DK DM DZ EE
ES FI GB GD GE GH GM HR HU ID IL IN IS JP KE KG KP KR KZ LC LK LR LS LT
LU LV MA MD MG MK MN MW MX MZ NO NZ PL PT RO RU SD SE SG SI SK SL TJ TM
TR TT TZ UA UG UZ VN YU ZA ZW

(EP) AT BE CH CY DE DK ES FI FR GB GR IE IT LU MC NL PT SE TR

(OA) BF BJ CF CG CI CM GA GN GW ML MR NE SN TD TG

(AP) GH GM KE LS MW MZ SD SL SZ TZ UG ZW

(EA) AM AZ BY KG KZ MD RU TJ TM

Main International Patent Class (v7): G06F-017/60

Publication Language: English

Filing Language: English

Fulltext Word Count: 14342

English Abstract

French Abstract

Legal Status (Type, Date, Text)

Publication 20011115 A2 Without international search report and to be
republished upon receipt of that report.

Declaration 20031002 Late publication under Article 17.2a

Republication 20031002 A2 With declaration under Article 17(2)(a); without
abstract; title not checked by the International
Searching Authority.

Detailed Description

SYSTEM AND METHOD FOR GENERATING A MULTIP-DIMENSIONAL
CALENDAR OBJECT IN REAL-TIME

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09/565421 5/5/2000

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Background

Field

The present invention relates to systems and methods for the scheduling of appointments. More particularly, this invention relates to the real-time generation and display of a graphical, multi-dimensional calendar to facilitate the scheduling of appointments with professionals.

Description of the Related Art

Successful management of one's time, whether an individual or a business, is becoming an increasingly important factor in determining one's success. Various planning calendars have been developed which allow for the making, recording, and organizing of appointments that permit one to better manage one's time.

One prevalent form of planning calendar is the paper organizer. The typical paper organizer is made up of a collection of pages that are pre-printed with lines or areas with designated times. For example, each page designates a single day. The appropriate times in the day, broken down in hour and fraction-of-hour increments, is printed along the left margin. Horizontal lines extending from designated time increments are also printed on the page. A user of the organizer is able to record meetings and appointments in the designated area on the paper, by manually making a written entry, in order to visually indicate when and with whom, the meetings or appoints are to occur. The user may record additional information about the **meeting** or **appointment**, provided there is space to do so.

More recently, the paper organizer has been transformed into an electronic organizer. The electronic organizer is a software program that executes on a computing device such as a personal computer. The electronic organizer is text-based in that it essentially presents the collection of pre-printed pages, typically contained in the paper organizer, on the computer's display device. In stead of making written **meeting** and **appointment** entries, the user makes a notation indicating a **meeting** or an **appointment** using an input device such as a keyboard.

Conventional planning calendars, whether paper or electronic, are either designed for a generic purpose or designed for a single purpose. The generic planning calendars are not tailored for a special purpose, but rather, are made for use by anyone, and, thus, the pages typically only contain a designation of time. The single purpose planning calendars are typically made for a single business purpose. The pages in these calendars are laid out 1 0 to optimize the associated business function. Thus, conventional planning calendars are not adaptable for use other than the use for which the calendar was initially made; the user either has a specializes calendar suited for one purpose or a generic calendar not well suited for any purpose.

1 5 Summ

The present invention is a system and method for creating and displaying a multidimensional calendar object from one or more calendar parameters.

For purposes of summarizing the invention, certain aspects, advantages, and novel features of the invention have been described herein. It is to

be understood that not necessarily all such advantages may be achieved in accordance with any one particular embodiment of the invention. Thus, the invention may be embodied or carried out in a manner that achieves or optimizes one advantage or group of advantages as taught herein without necessarily achieving other advantages as may be taught or suggested herein.

In one embodiment, an **appointment** scheduling system which generates a multidimensional calendar to facilitate the scheduling of appointments comprises: (1) a first.

computer configured to be connected to a network, the first computer is further configured to be remotely accessible over the network by a second computer; (2) a database implemented on a computer readable storage medium, the database accessible by the first computer, the database comprises a plurality of records wherein the records store a plurality of calendar attributes; and (3) a calendar object module executable in the first computer, the calendar object module configured to communicate with the database, the calendar object module further configured to evaluate at least one of the plurality of calendar attributes to dynamically generate a multi-dimensional calendar object having a plurality of cells arranged in a grid-like arrangement wherein a column of one or more cells in the grid-like arrangement corresponds to a time dimension and a row of one or more cells in the grid-like arrangement corresponds to a queue dimension.

In another embodiment, an **appointment** scheduling system comprises: (1) a first interface for allowing a professional subscriber to input a plurality of calendar attributes; (2) a database comprising a plurality of records storing the plurality of calendar attributes input by the professional subscriber; (3) a calendar object module configured to communicate with the database, the calendar object module further configured to evaluate at least one of the calendar attributes to generate a multi-dimensional calendar object comprising: (a) a plurality of cells arranged in a grid wherein the grid comprises at least 1 0 one column containing at least one cell, the grid further comprises at least one row containing at least one cell; (b) a first dimension indicated along the top of the grid; (c) a second dimension indicated along the side of the grid; and (d) a third dimension indicated on top of the grid.

In still another embodiment, a multi-dimensional calendar apparatus for facilitating the scheduling of appointments, the multi-dimensional calendar apparatus is generated from a plurality of calendar attributes stored on a database implemented on a computer readable storage medium, the multi-dimensional calendar apparatus comprises: (1) a grid-like arrangement of a plurality of cells, the grid-like arrangement comprises a horizontal alignment of one or more cells wherein each of the one or more cells in the horizontal alignment is associated with a time slot, the grid-like arrangement further comprises a vertical alignment of one or more cells wherein each of the one or more cells in the vertical alignment is a **queue** element in the associated time slot; and (2) a status associated with each of the plurality of cells in the grid-like arrangement, the status is indicated by a cell color.

In yet another embodiment, in a scheduling system, a method of generating a multidimensional calendar object comprises the acts of: (1) receiving a request to display the multi-dimensional calendar object through an

interface of the scheduling system; (2) retrieving one or more items of calendar attributes stored on a database implemented on a computer readable storage medium accessible by the scheduling system; (3) executing a calendar object: module executable in the scheduling system, the calendar object module configured to process the retrieved one or more items of calendar attributes to generate the multi-dimensional calendar object comprising: (a) a grid-like arrangement of a plurality of cells, the grid-like arrangement comprises a horizontal alignment of one or more cells wherein each of the one or more cells in the horizontal alignment is associated with a time slot, the grid-like arrangement further comprises a vertical alignment of one or more cells wherein each of the one or more cells in the vertical alignment is a **queue** element in the associated time slot; and (b) a status associated with each of the plurality of cells in the grid-like arrangement, the status is indicated by a cell color.

In a farther embodiment, a method of displaying a multi-dimensional calendar object on a display screen comprises the acts of- (1) receiving a request to display the multi-dimensional calendar object; (2) retrieving one or more items of calendar attributes from a database implemented on a computer readable storage medium; (3) analyzing the one or more items of calendar attributes; (4) displaying on the display screen a delineation of a period of time into a plurality of time slots; (5) displaying on the display screen a first row of at least one colored cell wherein the length of each colored cell corresponds to a length of time and the color of the colored cell corresponds to a status; (6) displaying on the display screen a first column of at least one colored cell, the first column of at least one colored cell is a **queue** for the corresponding period of time wherein each cell in the first column is an element in the **queue**; and (7) displaying a color legend on the display screen, the color legend associates each status with a unique color.

In still a farther embodiment, a method of accessing an **appointment** scheduling system which generates a multi-dimensional calendar, the **appointment** scheduling system is implemented on a first web site, the method comprises the acts of. (1) receiving a request to access the appointment scheduling system, the request is received from a web page in a second web site; (2) retrieving one or more items of calendar attributes from a database implemented on a computer readable storage medium; (3) analyzing the one or more items of calendar attributes; and (4) generating a multi-dimensional calendar object having a plurality of cells in a first row and a plurality of cells in a first column wherein each of the plurality of cells in the first row corresponds to a time slot and each of the plurality of cells in the first column corresponds to an element in a **queue**.

In yet a further embodiment, an **appointment** scheduling system which generates a multi-dimensional calendar to facilitate the scheduling of appointments comprises: (1) a means for receiving a plurality of calendar attributes from a professional subscriber; (2) a means for storing the plurality of calendar attributes; (3) a means for generating a multidimensional calendar object by evaluating at least one of the plurality of calendar attributes, the multi-dimensional calendar object comprising a grid-like arrangement of a plurality of cells, the grid-like arrangement comprises a horizontal alignment of one or more cells wherein each of

the one or more cells in the horizontal alignment is associated with a time slot, the grid-like arrangement comprises a vertical alignment of one or more cells wherein each of the one or more cells in the vertical alignment is a **queue** element in the associated time slot; and (4) a means for associating a status with each of the plurality of cells in the grid-like arrangement, the status is indicated by cell COIOT.

These and other embodiments of the present invention will also become readily apparent to those skilled in the art from the following detailed description of the embodiments having reference to the attached figures, the invention not being limited to any particular embodiment(s) disclosed.

Brief Description of the Drawings

Figure 1 is a representation of one embodiment of a collection of cells in a multidimensional calendar object.

Figure 2 is a system block diagram illustrating one embodiment of an overall network architecture suitable for the invention.

Figure 3 is a high-level block diagram illustrating one embodiment of the selected components of a protocol server.

Figure 4 is a flow chart illustrating a process by which the protocol server processes requests for services in accordance with one embodiment of the present invention.

Figure 5 is a representation of one embodiment of a calendar definition record.

Figure 6 is a representation of one embodiment of a services record.

Figure 7 is a representation of one embodiment of a schedules record.

Figure 8 is a representation of one embodiment of a queue description record.

Figure 9A is a representation of one embodiment of a professional interface suitable for defining a time dimension of the multi-dimensional calendar object.

Figure 9B is a representation of one embodiment of a professional interface suitable for defining a **queue** dimension of the multi-dimensional calendar object.

Figure 10 is a representation of one embodiment of a professional interface suitable for defining a service dimension of the multi-dimensional calendar object.

Figure 11 is a representation of one embodiment of the multi-dimensional calendar.

Figure 12 is a representation of one embodiment of a professional interface suitable for providing **queue** descriptions.

Figure 13 is a representation of one embodiment of the multi-dimensional calendar containing **queue** descriptions.

Figure 14 is a representation of one embodiment of a multi-dimensional calendar object illustrating a user's appointments with a professional subscriber.

Figure 15 is a representation of one embodiment of an **appointment**-scheduling window.

Figure 16 is a representation of another embodiment of a multi-dimensional calendar object illustrating the user's appointments with the professional subscriber.

Figure 17 is a representation of one embodiment of an **appointment** status window.

Figure 18 is a representation of one embodiment of a monthly calendar for the professional subscriber.

Figure 19 is a representation of one embodiment of a multi-dimensional calendar object illustrating the professional subscriber's scheduled appointments.

Detailed Description

An **appointment** scheduling system utilizes a multi-dimensional calendar object to facilitate an efficient offering of a professional's services to a user and an efficient scheduling of the offered services by the user. A professional may be any person, persons, or entity that offers one or more services to a consumer for consumption. A user is likewise any person, persons, or entity that is able to **schedule** with the professional for the consumption of one or more offered services.

One embodiment of the multi-dimensional calendar object comprises a grid-like arrangement of a collection of cells 102 as illustrated in Figure 1. The multi-dimensional calendar is a three dimensional array of information which is represented by a two dimensional grid-like arrangement of cells 102. A time dimension is represented along one dimension, for example, the x-axis, of the grid-like arrangement of cells. A **queue** dimension is represented along another dimension, for example, the y-axis, of the grid-like arrangement of cells. A service dimension is represented along another dimension, for example, the z-axis, of the grid-like arrangement of cells. Multi-dimensional calendar object and multidimensional calendar is used interchangeably herein.

In one embodiment, each cell 102 in the multi-dimensional calendar corresponds to a time slot. The length of the cell 102 indicates the length of time corresponding to the time slot. Each time slot is initially set to a default time of, for example, fifteen minutes, and thus, each cell 102 initially represents fifteen minutes in the time dimension.

Likewise, each column of cells 102 initially represents a fifteen-minute time slot. Time slots may advantageously be in multiples of the default time. For example, a time slot may be thirty minutes. A cell 102 occupying approximately two columns in the multidimensional calendar illustrates the thirty-minute time slot.

Each cell 102 also corresponds to a **queue** element in the queue dimension. Each **queue** element corresponds to a potential appointment that can be scheduled during a particular time slot. For example, four cells 102 **displayed** along the **queue** dimension (e.g.

four cells 102 in a column) correspond to four potential appointments that may be scheduled. The **queue** dimension may advantageously be used to define a business layout.

The business layout advantageously defines particular aspects of the professional's service.

0 For example, the business layout may be a dentist's office, and in particular, the number of patients the professional (i.e. dentist) can simultaneously handle during a particular time slot. The number of potential **patient** appointments may be related to the number of **patient** rooms in the dentist office. The number of cells 102 along the **queue** dimension is the number of potential appointments that can be scheduled and made with the professional. Thus, if the dentist can simultaneously handle four appointments during a 5 particular time slot, the multi-dimensional calendar will have four cells 102 (e.g. four rows of cells 102) in the appropriate time slot column. There is no requirement that the number of potential **patient** appointments be equal to the number of **patient** rooms. In describing the business layout, the dentist may specify an arbitrary number in specifying the number of potential **patient** appointments the dentist can handle.

In another example, the business layout may be a restaurant. The restaurant may have a total of twenty tables, of which ten are designated as available for **reservation** during a particular time slot. The twenty tables and the ten tables are analogous to the number of **patient** rooms and the number of potential **patient** appointments, respectively, that the dentist can simultaneously handle in the previous dentist office example.

Accordingly, the multi-dimensional calendar illustrating the business layout for the restaurant will have ten cells 102 in the appropriate time slot column.

Each cell 102 further corresponds to a service in the service dimension. The service dimension is advantageously comprised of a list of services that are offered by the professional to the user. In one embodiment, the professional specifies the list of services.

Referring again to the aforementioned dentist office example, the dentist may have specified three services, such as, by way of example, teeth cleaning, filling, and extraction, as being offered to users (i.e. patients). Each service may be keyed to a unique identifier such as, by way of example, a number. The display of the key corresponding to the particular service scheduled by a **patient** on the appropriate cell 102 advantageously indicates the scheduled service.

In one embodiment, the list of services in the service dimension is the same for all cells 102 comprising the multi-dimensional calendar. In another embodiment, each cell 102 may have a different list of services in the service dimension. Referring again to the dentist office example, the dentist may offer one list of services, for example, teeth cleaning, filling, and extraction, between 8 AM and 11 AM and a second list of services, for example, root canal, dentures, extraction, and crown work, between 12 PM and 5 PM.

In one embodiment, the **appointment** status of the **queue** element, the cell 102, is 1 or 0 indicated, for example, by a color of the cell 102. The

appointment status may be comprised of, by way of example, available for scheduling of **appointment**, not available for scheduling of **appointment**, scheduled for you, confirmed **appointment**, and the like.

Each status is advantageously associated with a unique color. Thus, the color of the cell 102 indicates the **appointment** status for the particular time slot.

15 The multi-dimensional aspect of the calendar, and the cells 102 comprising the calendar, facilitate an efficient utilization of time and resources. The multi-dimensional, calendar is adaptable for use by different professionals offering a variety of services.

Professionals in varying service industries to effectively describe and offer services, as well as, efficiently **schedule** the consumption of the offered services may utilize the multidimensional calendar.

Even though the **appointment** scheduling system of the present invention is suitable for implementation as a stand-alone application, the **appointment** scheduling system will be further disclosed in the context of an online application that is remotely accessible over a network such as the Internet, and, in particular, the World Wide Web (WWW).

Furthermore, even though the multi-dimensional calendar object of the present invention is suitable for advantageously describing any service, the multi-dimensional calendar object will be further disclosed in the context of describing the services offered by a dentist.

Throughout the drawings, components that correspond to components shown in previous figures are indicated using the same reference numbers.

Network Architecture

As illustrated in Figure 2, a system 20 includes a protocol server 202, a plurality of user computers 204, a plurality of content servers 206, and a communication medium 208. The protocol server 202, plurality of user computers 204 and the plurality of content servers 206 communicate with each other through the communication medium 208. The protocol server 202 and the content server 206 are comprised of one or more computers.

A computer, including the user computer 204 and the computers comprising the protocol server 202 and the content server 206, may be any microprocessor or processor (hereinafter referred to as processor) control device that permits access to the communication medium 208, including terminal devices, such as personal computers, workstations, servers, clients, mini computers, main-frame computers, laptop computers, a network of one or more computers, mobile computers, portable computers, handheld computers, palm top computers, set top box for a TV, an interactive television, an interactive kiosk, personal digital assistant, or an interactive wireless device, a mobile browser, or any combination thereof. The computers may possess input devices such as, by way of example, a keyboard, a keypad, a mouse, a microphone, or a touch screen, and output devices such as a computer screen, printer, or a speaker.

These computers, may be uniprocessor or multiprocessor machines. Additionally, these computers include an addressable storage medium such as, by way of example, a random access memory (RAM), a static random

access memory (SRAM), a dynamic random access memory (DRAM), an electronically erasable programmable read-only memory (EEPROM), a programmable read-only memory (PROM), an erasable programmable read-only memory (EPROM), hard disks, floppy disks, laser disk players, digital video disks, compact disks, video tapes, audio tapes, magnetic recording tracks, electronic networks, and other devices or technologies to transmit or store electronic content such as programs and data. In one embodiment, the computers are equipped with a network communication device such as a network interface card, a modem, or other network connection device suitable for connecting to the communication medium 208. Furthermore, the computers execute an appropriate operating system such as Linux, Unix, Microsoft Windows 95, Microsoft Windows 98, Microsoft Windows NT, Apple MacOS, IBM OS/2, and the like.

As is conventional, the appropriate operating system includes a communications protocol implementation that handles incoming and outgoing message traffic passed over the communication medium 208. In other embodiments, while the operating system may differ depending on the type of computer, the operating system will continue to provide the appropriate communications protocols necessary to establish communication links (also referred to as network connections) with the communication medium 208.

The computers, and the addressable storage medium of the computers, may advantageously contain program logic or other substrate configuration representing data and instructions, which cause the computer to operate in a specific and predefined manner as, described herein. In one embodiment, the program logic may advantageously be implemented as one or more modules. The modules may advantageously be configured to reside on the addressable storage medium and execute on one or more processors. The modules include, but are not limited to, software or hardware components that perform certain tasks. Thus, a module may include, by way of example, components, such as, software components, processes, functions, subroutines, procedures, attributes, class components, task components, object-oriented software components, segments of program code, drivers, firmware, micro code, circuitry, data, and the like.

As used herein, the term "profocal server" and "content server," is to be viewed as one or more computers and are not to be otherwise limiting in any manner. For example, the profocal server 202 may be comprised of one or more modules that execute on one or more computers. Furthermore, the profocal server 202 and the content server 206 need not be server based, but can be comprised of one or more modules that execute on one or more computers.

5 The communication medium 208 facilitates the transfer of electronic content between the attached computers. In one embodiment, the communication medium 208 includes the Internet. The Internet is a global network connecting millions of computers. The structure of the Internet, which is well known to those of ordinary skill in the art, is a global network of computer networks and utilizes a simple, standard common addressing system and communications protocol called Transmission Control Protocol/Internet Protocol (TCP/IP).

The connections between different networks are called "gateways," and the gateways serve to transfer electronic data worldwide.

One part of the Internet is the World Wide Web (<WW or Web). The Web is generally used to refer to both (1) a distributed collection of inter-linked, user-viewable hypertext documents (commonly referred to as "web documents" or "web pages" or "electronic pages" or "home pages") that are accessible via the Internet, and (2) the client and server components which provide user access to such documents using standardized Internet protocols. The web documents are encoded using Hypertext Markup Language (HTML) and the primary standard protocol for allowing the components to locate and acquire web documents is the Hypertext Transfer Protocol (HTTP). However, as used herein, the term Web is intended to encompass future languages and protocols which may be used in place of, or in addition to, HTML and HTTP.

The Web contains different computers that store and serve web pages, such as HTML documents, capable of displaying textual and graphical information on a computer screen.

These computers are generally referred to as "web sites." The content server 206 is comprised of one or more web sites that provide information on the Web. A web site is accessed through a unique Internet address that corresponds to a web page within the web site. The web page may advantageously organize the presentation of text, graphical images, video, and audio, as well as provide links to other web pages in the web site or the Web.

Furthermore, the web page may be implemented as a conduit for the dissemination of data and information from the web site as well as the receipt of data and information into the web site.

The communication medium 208 may advantageously be comprised of one or more of other types of networks. By way of example, the communication medium 208 can include local area networks (LANs), wide area networks (WANs), metropolitan area networks (MANs), public, internets, private intranets, a private computer network, a secure internet, a private network, a public network, a value-added network, interactive television networks, wireless networks, two-way cable networks, interactive kiosk networks, and the like. The communication medium 208 may comprise other communication protocols such as, by way of example, the International Standards Organization's Open Systems Interconnection, IBM's SNAC, Novell's Netware, and Banyan VINES, that facilitate communication between the attached computers.

In one embodiment, the protocol server 202 offers an **appointment** scheduling system that enables a subscribing professional to efficiently utilize the professional's resources. A professional first registers with the protocol server 202 by providing information such as, by way of example, name, address, login name, password, access password, company name, payment information, and the like, through one or more web pages. The login name and password is to be used by the professional subscriber in subsequently accessing the protocol server 202. The access password is used to gain access to the **appointment** scheduling application for the appropriate professional subscriber. The **appointment** scheduling application provides functionality to **schedule** appointments with the appropriate professional subscriber.

The protocol server 202 verifies the submitted information and creates an account for the professional. In one embodiment, the protocol server 202 may advantageously return a password to the professional, for example,

through an email message, for the professional to use in accessing the profcal server 202. Having registered with the profcal server 202, the professional becomes a professional subscriber of the profcal server 202 services including the appointment scheduling system.

The multi-dimensional calendar object of the profcal server 202 illustrates the dynamics of the professional subscriber's services. Through the multi-dimensional calendar object, the professional subscriber is able to define its services and availability for scheduling of appointments with one or more service consumers. The multi-dimensional calendar object displays the status of the professional subscriber's schedule. Thus, the profcal server 202, through the use of the multi-dimensional calendar object, advantageously enables the professional subscriber to efficiently allocate a precious commodity; time.

The professional subscriber, having registered with the profcal server 202, defines the dimensions of the multi-dimensional calendar object, and the professional's services offered through the multi-dimensional calendar object, by submitting data to the profcal server 202. The professional subscriber enters the data through one or more web pages.

The profcal server 202 processes the input data into one or more calendar attributes that describe the professional subscriber's multi-dimensional calendar object. The calendar 5 attributes are stored in one or more records in a database. The records are associated with the appropriate professional subscriber. Subsequently, the profcal server 202 accesses the appropriate records and retrieves the calendar attributes for the professional subscriber whenever generating the multi-dimensional calendar object corresponding to the professional subscriber. The professional subscriber may advantageously change or modify the dimensions and service definition depicted by the multi-dimensional calendar object, and thus, the calendar attributes. The records containing the calendar attributes are further discussed below.

The professional subscriber may advantageously restrict access to the professional's **appointment** scheduling application by requiring the submission of an access password. The required access password is specified during the professional's registration process. The professional subscriber distributes the access password to the users (e.g. potential clients, service consumers, etc.) the professional subscriber desires to receive requests for appointments from. In this manner, the professional subscriber may restrict appointments to a preferred client base. The profcal server 202 requires the submission of the appropriate access password before providing access to the particular professional subscriber's **appointment** scheduling application. In another embodiment, the professional subscriber may not require the submission of an access password to gain access to the professional subscriber's **appointment** scheduling application.

In one embodiment, a user registers with the profcal server 202 to use the **appointment** scheduling services. The user provides data, such as, by way of example, name, address, login name, one or more passwords, email address, and the like, through one or more web pages. The profcal server 202 processes the input data and creates a user subscriber account for the registered user. Subsequently, the registered user provides the login name and password to access the profcal server 202 services. Having

logged on, the user may utilize the profcal server 202 services, including accessing a particular professional subscriber's **appointment** scheduling application in order to **schedule** an **appointment** with the professional subscriber. The scheduled appointments are recorded in 1 0 appropriate database records. If the professional subscriber required the submission of an access password, the registered user provides the appropriate access password. in order to gain access to the professional subscriber's **appointment** scheduling application.

In one embodiment, the professional and the user utilize a browser executing on the user computer 204, or another computer providing access to the profcal server 202, to 1 5 register with, and access the services offered on the profcal server 202. The browser is a software program that allows a user to access different computers, including the profcal server 202 and the content servers 206, utilizing the communication medium 208. In one embodiment, the browser may be a standard browser such as the Netscape0 Navigator developed by Netscape, Inc., the MicrosoftQD Internet Explorer developed by Microsoft Corporation, a WebTV, an erabedded web browser on a handheld device, or the Rke. In another embodiment, other types of access software, such. as, by way of example, other types of Internet browsers, custom network browsers, communication software, cable modem software, point-to-point software, multi-point software, custom emulation software, and the like, could be used to implement the browser.

In one embodiment, the profeal server 202 is advantageously accessed through one or more web sites on the Web. One or more web pages in the web site may adyantageously contain a hyperlink that addresses the profcal server 202. Instantiating the hyperlink, using a pointing device such as a mouse or the Eke, causes the profcal server 202 to be accessed. Thus, a user can be browsing the professional subscriber's web site, decide that the user wants to make an **appointment**, and. appropriately instantiate the hyperfink to access the profcal server 202. In another embodiment, the profcal server 202 requires the web page containing the hyperlink to the profcal server 202 to contain embedded HTML access code that is executed upon instantiation of the hyperlink. On example of the embedded HTML code is as follows.

```
<BR><FORM ACTION="/scripts/cs.exe/UserCalendar2?ProfID=34"
METHOD=7ost">
<P>Login Name.
```

```
<BR><INPUT ME='7EXT" NAME=MoginName'5
<BR>Password.
```

```
<BR><INPUT ME=5TASSWORW NAME=7WI>
<BR><BR><INPUT ME=5SUBM1V NAME=' Togin" VALUE="Jump to
Calenda?>
<BR><fFORM>
<A HREF="javascript:window.history.go(-1);">Back to previous page</a>
</body>
</html>
```

The aforementioned HTML access code is distributed by the profcal server 202 to the professional subscriber for inclusion into one or more calling web pages, for example, on the professional subscriber's web site. Upon instantiation of the hyperlink to the profcal server 202, the HTML access code is executed. The HTMI, access code results in the transmission of

data to the profcal server 202 to request access to the appropriate professional subscriber's **appointment** scheduling application. The 'TrofID=34' value enables direct access to the professional subscriber's multi-dimensional calendar. In still another embodiment, the resulting transmission of data to the profcal server 202 may advantageously be encrypted to provide further security. It is envisioned that other similar access codes may be embedded in the calling web pages without detracting from the essence of the invention.

In one embodiment, the profcal server 202 may additionally require the user accessing the profcal server 202 from another web site to provide a login identification and password. If the user is not registered, the profcal server 202 may advantageously display a user registration web page that enables the user to register with the profcal server 202.

Subsequent to the submission of the user login identification and password, the profcal server 202 may require the registered user to provide an access password. (if the professional subscriber requested the submission of an access password) in order to access a particular professional subscriber's **appointment** scheduling application.

System Architecture

The profcal server 202 comprises an interface module 302, a calendar object module 304, a network module 306, and a profcal database 308 as illustrated in Figure 3.

The exemplary modules 302, 304, and 306 and the profcal database 308 are operably connected and thus able to communicate with each other.

The interface module 302 comprises one or more user interface web pages and one or more professional interface web pages. The interface module 302 serves the appropriate web pages on a computer display screen. The web pages are a conduit for the receipt and dissemination of data from and to both registered users and professional subscribers. The web pages are also a mechanism by which both registered users and professional subscribers request one or more services offered by the profcal server 202. For example, the user utilizes the user interface web pages to register with the profcal server 202 and.

access the services offered by the profcal server 202. The professional utilizes the professional interface web pages to register with the profcal server 202 and define the 15 professional's service and appointment availability.

The calendar object module 304 performs the appointment scheduling application functions as described herein. For example, the calendar object module 304 creates and validates both user and professional accounts, manages the calendar attributes for the professional subscribers, and creates the appropriate multi-dimensional calendar object.

In one embodiment, the operations performed by the calendar object module 304 may be classified as either updating calendar attributes or retrieving calendar attributes.

For example, once the registered user or professional subscriber logs onto the profcal server 202, an appropriate interface window is served onto the requesting computer display screen (state 402, Figure 4), and the calendar object module 304 monitors, the interface window for an

action (state 404). The calendar object module 304 can detect either a request to modify one or more calendar attributes (state 406) or a request to retrieve one or more calendar attributes (state 410). If, in state 406, the calendar object module 304 receives a request to modify one or more calendar attributes, the appropriate data received through the interface window is retrieved and subsequently stored in one or more appropriate records in the database (state 408).

If, in state 410, the calendar object module 304 receives a request to retrieve one or more calendar attributes, the requested attributes are retrieved from one or more appropriate records in the database (state 412). The calendar object module 304 performs any necessary processing of the retrieved attributes (state 414) before displaying the requested calendar attributes, in the appropriate format, in an appropriate interface window. As an example, the calendar object module 304 may receive a request, to generate and display a professional subscriber's multi-dimensional calendar. The calendar object module 304 retrieves the appropriate calendar attributes for the professional subscriber, processes the retrieved calendar attributes, and generates the multi-dimensional calendar object.

The network module 306 comprises program logic that enables the profcal server 202 to communicate over the communication medium 208. For example, the interface module 302 utilizes the network module 306 in serving the one or more user interface web pages or the one or more professional interface web pages on a remotely computer accessible through the communication medium 208.

The profcal database 308 contains the databases, tables, records, data, and other information as described herein. The profcal database 308, as well as other databases disclosed herein, may advantageously be implemented on addressable storage medium on the same or different computers. In one embodiment, the databases are implemented in Standard Query Language (SQL). SQL is a relational database language standard developed by the International Standards Organization (ISO). The databases can be implemented utilizing any number of commercially available products such as Oracle, Microsoft Access, and the like. The databases may be, by way of example, a relational database, an object oriented database, a hierarchical database, an LDAP directory, an object oriented-relational database, and the like. In another embodiment, the databases may conform to any other database standard, or may even conform to a non-standard, private specification. In still another embodiment, the databases may be implemented utilizing the file system provided with the particular computer's operating system.

Database Records

The calendar object module 304 creates a calendar definition record, as illustrated in Figure 5, for each professional subscriber. The calendar definition record advantageously defines the multi-dimensional calendar object, and in particular, the dimensions of the multi-dimensional calendar. The contents maintained in the calendar definition record are input by the professional subscriber or generated by the calendar object module 304 from data input by the professional subscriber. By way of example, ten fields are illustrated comprising a profid 502, caldefid 504, startdate 506, starttime 508, endtime 510, whichdays 512, maxoverlaps 514, excluding 516, active 518, and autoconfirm 520. One of ordinary skill in the art will appreciate that, for this record, or any other record described herein, any number of the fields may be broken

down into additional sub-fields, that additional fields can be added, and that the fields may be implemented in various data formats.

The profid 502 field contains an identification number that uniquely identifies each.

professional subscriber. The profcal server 202 generates and assigns the identification number to the professional as part of the registration process. The identification number identifies the various records maintained by the profcal server 202 with the appropriate professional subscriber. For example, the identification number may also identify a professional subscriber record (not illustrated) that contains the professional subscriber identification data submitted during the registration process.

The caldefid 504 field contains a record counter that identifies the one or more calendar definition records belonging to the professional subscriber. The profcal server 202 generates the record counter. The profcal server 202 may advantageously create one or more calendar definition records in maintaining the definition of the professional subscriber's. multi-dimensional calendar object. For example, a professional subscriber may specify its willirigness to accept appointments between 9 AM and 5 PM on Mondays and Tuesdays and between 1 PM and 5 PM on Wednesdays, Thursdays, and Fridays. In one embodiment, a first calendar definition record is generated to record the Monday and Tuesday availability and a second calendar definition record is generated to record the Wednesday, Thursday, and Friday availability. In another example, the professional subscriber may specify its willingness to accept three simultaneous appointinents between 9 AM and 12 NOON, and four simultaneous appointments between 1 PM and 5 PM. In one embodiment, a first calendar definition record is generated to record the willingness to accept three simultaneous appointments and a second calendar definition record is generated to record the willingness to accept four simultaneous appointments.

The startdate 506 field contains a start date specified by the professional subscriber.

The start date identifies the initial date the multi-dimensional calendar object is to be generated for the particular professional subscriber.

Accordingly, the profcal server 202 is unable to **schedule** an **appointment** for the professional subscriber before the start date.

Thus, the start date enables the professional subscriber to define certain aspects of the multi-dimensional calendar object and have these aspects take effect at a subsequent time.

The starttime 508 and endtime 5 1 0 fields contain a start time and end time specified by the professional subscriber. The start time and end time identifies a time

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period defined by the particular calendar definition record. The whichliday 512 field stores a selection of one or more days (e.g. Sunday, Monday, Tuesday, Wednesday, Thursday, Friday, and Saturday) specified by the professional subscriber and identifies the days defined by the particular calendar definition record.

The maxoverlaps 514 field contains the maximum. number of simultancous

appointments the professional subscriber is willing to **schedule** in the days and time periods specified in the particular calendar definition record. The maximum number is specified by the professional subscriber and defines the number of quietie elements displayed in the multi-dimensional calendar. The excluding 516 field may contain one or 10 more time periods or days, or a combination of both, specified by the professional subscriber. The excluding 516 field is an override factor. For example, the time periods contained in the excluding 516 field are excluded in generating the multi-dimensional calendar object. For example, a professional subscriber may advantageously specify an unwillingness to **schedule** appoints during the last two weeks of the year. This time period 1 5 will be maintained in the excluding 516 field. When the multi-dimensional calendar object is generated for the professional subscriber, the time specified in the excluding 516 field is designated as unavailable for scheduling regardless of the other calendar attributes.

The active 518 field specifies whether or not to include the particular calendar definition record in generating the multi-dimensional calendar object. The option to include or exclude the particular calendar definition record is specified by the professional subscriber. The autoconfinn 520 field specifies the method of **appointment** confirmation for the requested appointments scheduled during the times defined by the particular calendar definition record. The professional subscriber specifies the method of confirmation. In one embodiment, the confirmation methods comprise the following: 1) automatically confinn all appointments scheduled during the times defined by the particular calendar definition record, 2) do not automatically confinn appointinents scheduled during the times defined by the particular calendar definition record, or 3) defer to the service confinnation setting. The service confirmation setting will be further discussed below. In one embodiment, the profcal, server 202 may advantageously confirm requested appointments by methods such as, by way of example, email, page, voice mail, teleplione, fax, message via a notes application, and the like.

Thus, the profcal server 202, and in particular the calendar definition record maintained by the profcal server 202, provides each professional subscriber great flexibility and power in defining the dimensions of the professionalPs multi-dimensional calendar object. This flexibility enables the multi-dimensional calendar object to convey the uniqueness of the particular professional subscriber as defined by the professional subscriber.

The calendar object module 304 creates a services record, as illustrated in Figure 6, for each professional subscriber. The services record advantageously defines a service provided by the professional subscriber and offered, through the proibal. server 202, to registered users. The contents maintained in the services record are input by the professional subscriber or generated by the calendar object module 304 from data input by the professional subscriber. By way of example, eightfields are illustrated comprising a profid 502, serviceid 602, dese 604, duration 606, price 608, maxcontdays 610, active 612, autoconfirm 614, and areaid 616.

The profid 512 field contains the professional subscriber identificalon that is used to properly associate the professional subscriber and the particular services record. The serviceid 602 field content is generated

by the profcal server 202 and identifies the service defined by the particular services record. The dese 604 field contains a description of the service, identified by the serviceid 602 field, defined by the particular services record. The duration 606 field contains the time necessary to provide the particular service. The price 608 field contains the price charged by the professional subscriber for the particular service. The professional subscriber supplies the contents of the dese 604, duration 606, and price 608 when defining the service.

The active 612 field specifies whether or not to include the particular services record in generating the multi-dimensional calendar object. The option to include or exclude the particular services record is specified by the professional subscriber. The autoconfinn 614 field specifies whether or not appointments scheduled for the service defined by the particular services record is to be automatically confirmed by the profcal.

server 202. The professional subscriber specifies the autoconfinn 614 content.

The areaid 616 field contains the category of professional subscriber as specified by the professional subscriber. In one embodiment, the profcal, server 202 maintains a list of one or more professional categories. Associated with each professional category may be a list of default services maintained by the profcal, server 202. For example, one professional category may be "dentist." For this category, the profcal server may provide a default list of services such as, by way of example, cleaning, crown, deep cleaning, gum base check, removing, and the Eke. The profcal, server 202 offers the default list: of services to a professional subscriber who identifies him or herself as a dentist. The professional subscribers may then select services from the default list of services or define one or more unique services as necessary to appropriately define the professional subscriber's services. The profcal server 202 access the data contained in the services record in providing the **appointment** scheduling service. For exaraple, the services defined in the one or more services record and offered by a particular professional subscriber may advantageously be displayed in a web page. A registered user authorized to access the particular professional subscriber's **appointment** scheduling application may be presented with the list of offered services, and appropriately **schedule** an **appointment** for an offered service. The scheduled service is additionally specified on the multi-dimensional calendar object. Thus, the proical server 202 provides the professional subscriber immense flexibility in defining and offering one or more services to potential service consumers.

The calendar object module 304 creates a schedules record, as illustrated in Figure 7, for each **appointment** scheduled with a professional subscriber. (inverted exclamation mark)he contents maintained in the schedules record are input by an entity scheduling the appointment or generated by the calendar object module 304 from data input by entity. An entity scheduling the **appointment** may be, by way of example, a registered user, the professional subscriber, or an entity authorized to **schedule** an **appointment**. By way of example, eighteen fields are illustrated comprising a profid 502, userid 702, dtime 704, enddtime 706, **queue** 708, confinned 71 0, serviceid 602, contdays 712, contdayidx 714, profnote 716, reason 71 8, created 720, prating 722, pratingdate 724,

urating 726, uratingdate 728, pratingnote 730, and uratingnote 732.

The profid 512 field contains the professional subscriber identification that identifies the professional subscriber scheduled for the **appointment** defined by the particular schedules record. The userid 702 field contains a user identification identifying the registered user scheduled for the **appointment** defined by the particular schedules record. In one embodiment, the profcal server 202 creates a unique user identification for each registered user. In addition to identifying the requesting user in the schedules record, the user identification may advantageously be used to appropriately associate the registered user to other records, such as, by way of example, a user registration record (not illustrated) that contain information submitted by the user during the registration process, maintained by the profcal server 202.

The dtime 704 field contains the start time of the scheduled **appointment** defined by the particular schedules record. The user scheduling the **appointment** specifies the start time. The enddtime 706 field content is generated by the profcal server 202 and specifies the end time of the scheduled **appointment**. In one embodiment, the profcal server 202 calculates the end time from the service dimension parameters (calendar attributes), and in particular, the data maintained in the servcid 602 field in the schedules record (the service scheduled for) and the duration 606 field in the appropriate services record (the time necessary to provide the scheduled service). The profcal server 202 may also utilize data contained in other database records to determine the end time of the scheduled **appointment**.

The **queue** 708 field contents identify the **queue** entity (the particular cell 102) requested by the user when scheduling the particular **appointment**. The confirmed 710 field contains a flag value that indicates whether the scheduled **appointment** is confirmed.

The profcal server 202 generates the confirmation flag value. The serviceid 602 field content identifies the service requested by the user during the scheduled **appointment**.

The contdays 712 field content is generated by the profcal server 202 and specifies the number of consecutive days required for the particular scheduled **appointment**. For example, an automobile repair business, operating eight hours, per day, Monday through Friday, may offer a valve job service that takes twenty hours to complete. Thus, any **appointment** for this service requires more than one day. The contdays 712 field value specifies the number of days to perform the scheduled service. In one embodiment, the profcal server 202 calculates the number of consecutive days from the service dimension calendar attributes.

The contdayidx 714 field content is generated by the profcal server 202 and keeps track of the consecutive business days required to complete the scheduled service. In the prior automobile repair example, if the **appointment** for the valve job is scheduled to start on a Friday morning, the contdayidx 714 field may (inverted exclamation mark) identify Friday, Monday, and Tuesday, as the consecutive business days required to perform the scheduled service.

Maintaining the schedules record, and in particular the data in the aforementioned fields, enables an efficient generation of the

multi-dimensional calendar object.

Furthermore, the schedules record data facilitate the clear illustration of the scheduled services in the multi-dimensional calendar object.

The profflote 716 field is utilized by the profcal server 202 to store the professional subscriber's note, if any, to the user requesting the **appointment** in a manual confirmation scenario. As part of manually confirming a requested **appointment**, the professional subscriber may enter a note to the user. For example, a **doctor** manually confirming an appointment with a **patient** (user) may tell the **patient** to "not eat anything for at least ten hours before the appointment" in a note. In one embodiment, the note is advantageously transmitted to the user along with the **appointment** confirmation.

The reason 718 field contains a user provided note, assuming the user entered a note, to the professional subscriber at the time of scheduling the **appointment**. For example, the user may request an **appointment** with a dentist for a root canal. In scheduling this **appointment**, the user may provide a note to the dentist that the user prefers a specific drug. This note is stored in the reason 718 field, and subsequently displayed to the dentist when the dentist checks the scheduled appointments. The created 720 field content is generated by the profcal server 202 and specifies the date the user accessed the profcal server 202 to request the scheduling of the particular **appointment**.

The prating 722 field contains an indication of a user rating as provided by the professional subscriber. The user rating may identify ratings such as, by way of example, preferred, good, fair, poor, and the like. The pratingdate724 field content specifies the date the professional subscriber rated the user scheduling the particular **appointment**. The 15 pratingnote 730 field contains any note provided by the professional subscriber regarding the particular user rating.

The urating 726 field contains an indication of a professional rating as provided by the user consuming the scheduled service. The professional rating may identify ratings such as, by way of example, excellent, good, fair, poor, and the like. The uratingdate728 field content specifies the date the user rated the professional subscriber providing the scheduled service. The uratingnote 732 field contains any note provided by the user regarding the particular professional subscriber rating.

The calendar object module 304 creates a **queue** description record, as illustrated in Figure 8, for each **queue** description provided by a professional subscriber. The **queue** description record advantageously provides the capability for the professional subscriber to attach a description to each **queue** element defined by the calendar definition record. By way of example, three fields are illustrated comprising a profid 502, **queueid** 802, and description 804.

The profid 502 field contains the professional subscriber identification that identifies the professional subscriber. The **queueid** 802 field content is specified by the professional subscriber and identifies the appropriate **queue** element in the multidimensional calendar object. The description 804 field contains the description of the **queue** element provided by the professional subscriber.

Defining 'alendar Dimensions

In one embodiment, a professional registers with the profcal server 202 to become a professional subscriber of the **appointment** scheduling services. As part of the registration process, the professional specifies a category, such as, by way of example, dentist, **doctor**, restaurant, automobile repair service, attorney, general, and the like, to describe the professional's service category. The profcal server 202 utilizes the service categories to efficiently assist the professional subscriber define the service dimension.

For example, for a dentist category, the profcal server 202 may advantageously maintain a service list: of from which the professional subscriber (dentist) may select one or more services to define his or her service dimension. In another embodiment, the profcal server 202 may associate one or more default service parameters for each service in the service list. The professional subscriber may advantageously modify the default service parameters in defining his or her service dimension.

Having registered with the profcal server 202, the professional subscriber logs onto the profcal server 202 and defines the dimensions of the professional subscriber's multidimensional calendar object. The profcal server 202 allows the professional subscriber to subsequently modify the professional subscriber's multi-dimensional calendar object dimensions.

By way of example, Dr. Ayman Asem, a dentist, registers with the profcal server 202 using the login name "abc dent." Dr. Asem proceeds to define the **time** dimension and **queue** dimension of his multi-dimensional calendar object. Dr. Asem accesses a professional interface web page (Figure 9A) and specifies that he is willing to **schedule** four simultaneous **patient** appointments (Max overlaps 4, Figure 9A) between the hours of 6 PM (Start time 1800, Figure 9A) and 8 PM (End time 2000, Figure 9A), Monday through Friday (Which days, Figure 9A). Dr. Asem further specifies that he is willing to **schedule** two simultaneous **patient** appointments (Max overlaps 2, Figure 9B) between the hours of 8 AM (Start time 800, Figure 9B) and 5 PM (End time 1700, Figure 9B), Monday through Friday (Which days, Figure 9B).

Dr. Asem may then proceed to define the service dimension of his multidimensional calendar object by specifying one or more services he is willing to offer for scheduling of appointments. Dr. Asem utilizes a professional interface web page (Figure 10) and selects a service from the list of services maintained by the profcal server 202 for the category "dentists." In the example, as illustrated in Figure 10, Dr. Asem selects "teeth cleaning" as an offered service. Dr. Asem specifies that the teeth cleaning will require fifteen minutes to perform at a charge of \$50. Furthermore, Dr. Asem requests the profcal server 202 to make the cleaning service active (offer the defined cleaning service for scheduling of appointments) and for the profcal server 202 to automatically confirm teeth cleaning appointments. Dr. Asem utilizes the web page to additionally offer a "crown" service and a "gum. base check" service. In one embodiment, the profcal server 202 permits the professional subscriber to not only select a service from the service list, but also to specify one or more services that are not on the service list.

Continuing the prior dentist example, Dr. Asem may then request to view his **schedule** for a particular day, for example, April 26, 2000. The profcal server 202 accesses 1 0 the various database records containing the calendar attributes and creates a multidimensional calendar object as illustrated in Figure 1 1. The multi-dimensional calendar object is displayed through a web page that is served by the profcal server 202 onto a display screen of a computer from which Dr. Asem requested to view his **schedule** .

In one embodiment, the multi-dimensional calendar comprises an arrangement of cells 102 in a grid (Figure 1 1). The grid's dimension is ninety-six columns of cells 102 (each cell represents the default fifteen minutes and all twenty-four hours in the day are illustrated) by four rows of cells 102 (the number of rows corresponds to the maximum overlaps specified by the professional). The multi-dimensional calendar displays the full twenty-four hours in the day. The times Dr. Asem is willing to accept requests to **schedule** appointments is indicated on the multi-dimensional calendar by the appearance of the cells 102. For example, as illustrated in Figure 1 1, the cells 102 corresponding to the **time** slots and **queue** elements in which Dr. Asem is willing to **schedule** appointments (available for online **schedule**) are indicated by a color, for example, green (shown by vertical hatching).

The cells 102 corresponding to the **time** slots and **queue** elements in which Dr. Asem is not willing to **schedule** appointments (not available for online **schedule**) are indicated by a different color, for example, red (shown by horizontal hatching). In another embodiment, the multi-dimensional calendar may be comprised of the cells 102 corresponding to the **time** slots and **queue** elements in which the professional subscriber is willing to **schedule** appointments. Thus, the cells 102 corresponding to **time** slots and **queue** elements in which the professional subscriber is not available for scheduling of appointments will not be displayed.

In one embodiment, a service legend and a color legend is displayed with the multidimensional calendar. The service legend lists the services offered by the professional subscriber. The color legend comprises associates a meaning to a particular color designation.

In another embodiment, the professional subscriber may associate one or more cells 102 in defining the service dimensions. Returning to the prior example, Dr. Asem may offer the cleaning service only between 6 PM and 8 PM. In this instance, if a user (**patient**) attempts to **schedule** a teeth-cleaning **appointment** during any other time, the profcal server 202 returns an appropriate error message. In still another embodiment, clicking the desired cell 102 causes the display of the available services for the particular **time** slot and **queue** element corresponding to the particular cell 102.

1 0 In one embodiment, the professional subscriber may advantageously provide a description for the **queue** elements specified by the professional and depicted in the professional's multi-dimensional calendar object. The descriptions may convey the professional's business layout. Continuing the prior example, Dr. Asem. utilizes a "Maintain **Queue** Descriptions" professional interface web page (Figure 12) and specifies a **queue** description for the four **queue** elements comprising

the **queue** dimension (the **queue** dimension was previously defined by Gr. Asem to include four queue elements). Dr.

Asem may associate each of the queue elements with a **patient** room in his office, and furthermore, provide a brief description of each room (Figure 12). Dr. Asem may advantageously provide a global description generally describing one or more aspects of his business. In one embodiment, the professional subscriber may provide a **queue** description for certain of the **queue** elements and not provide a **queue** description for the other queue elements.

Subsequent to providing one or more **queue** descriptions, the professional subscriber may request to view the multi-dimensional calendar for a particular day.

Returning to the prior example, Dr. Asem may request to view his **schedule** for May 9, 2000. In response the profcal server 202 displays Dr. Asem's multi-dimensional calendar for May 9, 2000 (Figure 13). As illustrated in Figure 13, each row of cells 102 is associated with a **queue** description hyperlink 1302. In one embodiment, the presence of a **queue** description hyperlink 1302 designates that the appropriate **queue** element has a corresponding **queue** description. Instantiating the **queue** description hyperlink 1302, using a pointing device such as a mouse or the Eke, **displays** the **queue** description for the corresponding **queue** element. In another embodiment, **queue** descriptions for all cells 102 may be displayed regardless of the actual **queue** description hyperlink 1302 instantiated.

Scheduling of Appointments

In one embodiment, a registered user logs onto the profcal server 202 and requests to access a particular professional subscriber's **appointment** scheduling application. The profcal server 202 may require an access password from the registered user before granting the user access to the requested professional subscriber's **appointment** scheduling application. Subsequent to verifying the access password, if one was required, the profcal server 202 grants the user access to the, requested professional subscriber's **appointment** scheduling application. The user may then request to view the professional subscriber's multi-dimensional calendar for a particular day.

Resuming the previous dentist example, John Petrora, a registered user and a **patient** of Dr. Asem, may request to access Dr. Asem's **schedule** for April 26, 2000. The profcal, server 202 subsequently creates and, displays Dr. Asem's multi-dimensional calendar object for April 26, 2000 (Figure 14). In one embodiment, the multi-dimensional calendar indicates the appointments scheduled for John Petrora. Appointments scheduled for all other patients are indicated as "not available for **schedule** ." Thus, John Petrora is only able to his scheduled appointments and not any other patients.

In one embodiment, the cell 102 color indicates the appointment status for the particular **queue** element. For example, gray colored cells 102 (shown by horizontal hatching) indicate **queue** elements or **time** slots not available for scheduling, and green colored cells 102 (shown by vertical hatching) indicate **queue** elements or **time** slots available for scheduling by John Petrora. If John Petrora had previously scheduled

one or more. appointments with Dr. Asem for April 26, 2000, then John's confirmed appointments are indicated by blue colored cells 102 (shown by diagonal hatching) and John's scheduled, but not confirmed appointments are indicated by yellow colored cells 102 (shown by cross hatching).

In one embodiment, the user requests to **schedule** an **appointment** by instantiating a cell 102 that is available for scheduling (e.g. green colored cell 102). Instantiating a cell 102 not available for scheduling may result in a non-action or may result in the display of an appropriate error message. Continuing the prior dentist example, John Petrora wants to **schedule** a cleaning **appointment** with Dr. Asem at 8 AM in **patient** room number 1 (described by Dr. Asem as "the state of the art filling room"). Thus, John instantiates cell 1402 (Figure 14) using a pointing device. In response, the profcal server 202 displays an **appointment**-scheduling window (Figure 15). John may utilize the appointment scheduling window to **schedule** the desired cleaning **appointment** with Dr. Asem. A service pull-down list: 1502 may advantageously list the services that are available for scheduling at the requested **time** slot and **queue** element. From the service pull-down list 1502, John can select the cleaning service and subsequently **schedule** the appointment.

In one embodiment, the service pull-down list 1502 lists the services that are capable of being scheduled during the specified time slot. For example, if Dr. Asem also offered a "root canal" service defined to require four hours, the profcal server 202 advantageously does not list the root canal service in the pull-down list 1502 (Figure 15) because the requisite four hours are not available to be scheduled (there is a prior appointment at 10 AM, made by another **patient**, for **patient** room number 1). In another embodiment, the profcal server may list all the services in the service pull-down list 1502.

Subsequently, if a user requests a service that is incapable of being scheduled at the requested time slot, the profcal server 202 may display an appropriate error message.

Returning to the prior dentist example, subsequent to scheduling the cleaning **appointment**, John Petrora also schedules an appointment at 11:45 AM with Dr. Asem, in 5 **patient** room number 2, for a "crown" service. Subsequently John can request to view Dr.

Asem's calendar for April 26, 2000. The profcal server 202 again creates and displays Dr.

Asem's multi-dimensional calendar object as illustrated in Figure 16. John's two scheduled appointments are now indicated on the multidimensional calendar by blue colored cells 102 (shown by diagonal hatching in Figure 16). The two appointments are indicated as being confirmed because Dr. Asem previously requested the profcal server 202 to automatically confirm requests to **schedule** these types of appointments. Otherwise, John's two scheduled appointments are indicated on the multi-dimensional calendar as being scheduled, but not yet confirmed.

In one embodiment, the scheduled for service is also indicated on the multidimensional calendar. Referring again to Figure 16, the profcal server 202 indicates John Petrora's cleaning **appointment** by displaying a "1" in the cell 102 corresponding to **patient** room number 1 at 8 AM. The crown **appointment** is indicated by a "2" displayed in the

appropriate cell 102. Furthermore, the length of the cell 102 indicating the crown **appointment** extends for a period of thirty minutes (from 11:45 AM to 12:45 PM). Thus, John is able to quickly identify his appointments, as well as the duration of each **appointment**, by looking at the multi-dimensional calendar object.

In one embodiment, the user is able to ascertain the status of his or her appointments by instantiating the appropriate cell 102. Returning to the prior dentist example, John Petrora may want to view the status of the crown **appointment** scheduled with Dr. Asem on April 26, 2000. John instantiates the appropriate cell 102 indicating his crown **appointment** on Dr. Asem's multi-dimensional calendar for April 26, 2000 (Figure 16). Instantiating on the appropriate cell 102 causes the profcal server 202 to display an appointment status window as illustrated in Figure 17. The **appointment** status window contains information and status regarding John's scheduled **appointment** with Dr. Asem on April 26, 2000, to receive a crown.

In one embodiment, the user is able to delete the user's previously scheduled appointments. For example the user can instantiate the cell 102 indicating a scheduled **appointment**, whether confirmed or not, for the user to display the appointment status window. The **appointment** status window may advantageously provide an option enabling the user to cancel the scheduled appointment. The profcal server 202, in response to the user cancellation of a scheduled **appointment**, may notify the professional subscriber of the cancellation. Furthermore, the appropriate cells 102 will indicate the proper status, for example, that the time slots are available for scheduling. In another embodiment, the 15 profcal server 202 may permit the user to only cancel non-confirmed appointments.

Viewing Scheduled Appointments

In one embodiment, a professional subscriber, or a person or entity authorized by the professional subscriber, may log on to the profcal server 202 by submitting the appropriate login and necessary password. Subsequently, the professional subscriber may be presented with a monthly calendar (Figure 18). The monthly calendar illustrates four consecutive weeks. Furthermore, the monthly calendar visually indicates the days the professional subscriber is not willing to **schedule** appointments (not enabled for sign ups), the days the professional subscriber has enabled for scheduling but which do not currently have any scheduled appointments, and the days the professional subscriber has currently The multi-dimensional calendar object indicates all scheduled appointments with Dr.

Asem, including the status of each scheduled **appointment**, the duration of each scheduled **appointment**, and the **queue** element scheduled by each **appointment**. Furthermore, the multi-dimensional calendar object also indicates the time slots that are unavailable for scheduling as well as the time slots that are available for scheduling.

In one embodiment, the profcal server 202 enables the professional subscriber to manually **schedule** appointments. The professional subscriber can manually **schedule** an appointment by instantiating an appropriate cell 102 that is available for scheduling and that corresponds to the requested **time** slot and, **queue** element. Subsequently, the profcal server 202 displays a window from which the professional subscriber may manually **schedule** an **appointment**. The

professional subscriber's manually scheduled appointments are appropriately indicated, for example by blue colored cells 102, in the multidimensional calendar object. Thus, the manual appointment-scheduling feature enables the professional subscriber to utilize the profcal server 202 for both online and manual 1 5 scheduling of appointments.

In another embodiment, the professional subscriber is able to manually **schedule** an **appointment** for any time slot, irrespective of the time slots current status. Thus, the professional subscriber is advantageously permitted a facility in which the professional can override the time slot settings. For example, the professional subscriber may manually **schedule** an **appointment** at times designated as unable for **appointment** scheduling. The professional subscriber may also manually **schedule** appointments for time slots that are currently scheduled. In this instance, the profcal server 202 may notify the user previously scheduled for that time slot that the user's **appointment** has been cancelled.

In one embodiment, the professional subscriber is able to modify or alter the professional's scheduled appointments. For example, the professional subscriber may instantiate the cell 102 indicating a manually scheduled **appointment** and deletes the manually scheduled **appointment**. The professional subscriber may also confirm a scheduled, but not confirmed, **appointment**: by instantiating the cell 102 indicating the scheduled **appointment**. The profcal server 202 may advantageously display an **appointment** confirmation window from which the professional subscriber can confirm the scheduled **appointment**. The professional subscriber may determine the status of a scheduled **appointment** by instantiating the appropriate cell 102 indicating the scheduled **appointment**. The profcal server 202 displays an **appointment** status window for the professional. In one embodiment, the professional may alter the status of the appointment, for example, confirm the **appointment**, cancel the **appointment**, send the user scheduled for the appointment a message, and the like, through the appointment status window.

Subsequent to any professional subscriber action that affects a particular user, the profcal server 202 may appropriately notify the user.

This invention may be specified in other specific forms without departing from the essential characteristics as described herein. The embodiments described above are to be considered in all aspects as illustrative only and not restrictive in any manner. The following claims rather than the foregoing description indicate the scope of the invention.

Claim

1 An **appointment** scheduling system which generates a multi-dimensional calendar to facilitate the scheduling of appointments, the appointment scheduling system comprising:
a first computer configured to be connected to a network, the first computer (inverted exclamation mark)s further configured to be remotely accessible over the network by a second computer;
a database implemented on a computer readable storage medium, the database accessible by the first computer, the database comprises a plurality of 1 0 records wherein the records store a plurality of calendar attributes; and
a calendar object module executable in the first computer, the calendar

object module configured to communicate with the database, the calendar object module further configured to evaluate at least one of the plurality of calendar attributes to dynamically generate a multi-dimensional calendar object having a plurality of cells arranged in a grid-like arrangement wherein a column of one or more cells in the grid-like arrangement corresponds to a time dimension and a row of one or more cells in the grid-like arrangement corresponds to a **queue** dimension.

2 The system as defined in Claim 1, wherein the network (inverted exclamation mark)s a World Wide Web. 3 . The system as defined in Claim 1, wherein the first computer comprises a web site.

4 The system as defined in Claim 1, wherein the appointment scheduling system (inverted exclamation mark)s accessible over the network through a web browser executing on the second computer.

5 The system as defined in Claim 1, wherein the appointment scheduling system (inverted exclamation mark)s accessible through a hyperlink in a web page implemented on the second computer.

6 The system as defined in Claim 1, wherein the time dimension represents a twenty-four hour period.

7 The system as defined in Claim 1, wherein the time dimension represents one or more time slots available for scheduling. 8. The system as defined in Claim 1, wherein the time dimension (inverted exclamation mark)s delineated in fifteen-minute increments. . The system as defined in Claim 1, wherein the column of one or more cells represents a **queue** of available appointments for the associated time dimension.

10 The system as defined in Claim. 1, wherein the queue dimension is delineated by a plurality of hyperlinks.

11 The system as defined in Claim 1, wherein one or more cells in the column of one or more cells have a corresponding service description.

12 The system as defined in Claim 1, wherein each of the cells in the multidimensional calendar object is displayed in one of a plurality of colors wherein each of the plurality of colors is associated with an **appointment** status.

13 The system as defined in Claim 1, wherein the plurality of cells is of varying lengths indicating a time period wherein the time period is a multiple of fifteen minutes.

14 The system as defined in Claim. 1, wherein the cell length indicates the length of a scheduled **appointment** .

15 The system as defined in. Claim 1, wherein at least one of the pluralities of cells displays a number which identifies a scheduled service.

16 An **appointment** scheduling system comprising:
a first interface for allowing a professional subscriber to input a plurality of calendar attributes;
a database comprising a plurality of records storing the plurality of calendar attributes input by the professional subscriber;
a calendar object module configured to communicate with the database, the calendar object module further configured to evaluate at least one of the calendar attributes to generate a multi-dimensional calendar object comprising:
a plurality of cells arranged in a grid wherein the grid comprises at least one column containing at least one cell, the grid further comprises at least one row containing at least one cell;
a first dimension indicated along the top of the grid;
a second dimension indicated along the side of the grid; and
a third dimension indicated on top of the grid.

17 The system as defined in Claim 16, wherein the first dimension indicates time periods. . The system as defined in Claim 16, wherein the second dimension indicates a number of appointments which can be scheduled with the professional subscriber in a particular time period as indicated by the first dimension.

19 The system as defined in Claim 16, wherein the third dimension is a service dimension comprised of a plurality of services offered by the professional subscriber.

20 The system as defined in Claim, 16, wherein the multi-dimensional calendar object further comprises a status dimension.

21 The system as defined in Claim. 16, wherein the grid comprises a first column containing a first number of cells available for scheduling and a second column containing a second number of cells available for scheduling wherein the first number is different from the second number.

22 A multi-dimensional calendar apparatus for facilitating the scheduling of appointments, the multi-dimensional calendar apparatus is generated from a plurality of calendar attributes (inverted exclamation mark) bute (inverted question mark) stored on a database implemented on a computer readable storage

5 medium, the multi-dimensional calendar apparatus comprising:
a grid-like arrangement of a plurality of cells, the grid-like arrangement comprises a horizontal alignment of one or more cells wherein each of the one or more cells in the horizontal alignment is associated with a time slot, the grid-like arrangement further comprises a vertical alignment of one or more cells wherein each of the one or more cells in the vertical alignment is a **queue** element in the associated time slot; and
a status associated with each of the plurality of cells in the grid-like arrangement, the status is indicated by a cell color.

23 ' The apparatus as defined in Claim. 22, wherein the cell color of the cell indicates that the cell is not available for online scheduling.

24 The apparatus as defined in Claim 22, wherein the cell color of the cell indicates that the cell is available for online scheduling.

25 The apparatus as defined in Claim 22, wherein the cell color of the cell indicates that the cell has a confirmed **appointment** .

26 The apparatus as defined in Claim 22, wherein the cell color of the cell indicates that the cell has been scheduled online.

27 The apparatus as defined in Claim 22, wherein the cell color of the cell indicates that the cell is available for manual scheduling.
. The apparatus as defined in Claim 22, wherein the length of the cell indicates the length of the scheduled **appointment** .

29 The apparatus as defined in Claim 22 further comprising a number displayed in the cell, the number indicates a scheduled service.

30 The apparatus as defined in Claim 22, wherein the status identifies all appointments scheduled by all users.

31 The apparatus as defined in Claim 22, wherein the status identifies all appointments scheduled by a particular user.

32 In a scheduling system, a method of generating a multi-dimensional
1 0 calendar object comprising the acts of receiving a request to display the multi-dimensional calendar object through an interface of the scheduling system; retrieving one or more items of calendar attributes stored on a database implemented on a computer readable storage medium accessible by the scheduling
1 5 system;
executing a calendar object module executable in the scheduling system, the calendar object module configured to process the retrieved one or more items of calendar attributes to generate the multi-dimensional calendar object comprising:
a grid-like arrangement of a plurality of cells, the grid-like arrangement comprises a horizontal alignment of one or more cells wherein each of the one or more cells in the horizontal alignment is associated with a time slot, the grid-like arrangement further comprises a vertical alignment of one or more cells wherein each of the one or more cells in the vertical alignment is a queue element in the associated time slot; and
a status associated with each of the plurality of cells in the grid-like arrangement, the status is indicated by a cell color.

33 The method as defined in Claim, 32, wherein, the scheduling system is a web site.

34 The method as defined in Claim 32, wherein the interface is a web page.

35 The method as defined in Claim 32, wherein the request is entered through

a professional subscriber interface.

36 The method as defined in Claim, 32, wherein the request is entered through a user interface. . The method as defined in Claim 32 further comprising the acts of receiving a professional subscriber identification; and verifying the received professional subscriber identification.

39 The method as defined in Claim. 32 further comprising the act of displaying the multi-dimensional calendar object on a display screen accessible by the scheduling system.

40 The method as defined in Claim 32 further comprising the act of receiving one or more items of calendar attributes from a professional subscriber.

41 The method as defined in Claim 32 further comprising the act of receiving one or more items of calendar attributes from a user.

42 A method of displaying a multi-dimensional calendar object on a display screen comprising the acts of. 1 5 receiving a request to display the multi-dimensional calendar object; retrieving one or more items of calendar attributes from a database implemented on a computer readable storage medium; analyzing the one or more items of calendar attributes; displaying on the display screen a delineation of a period of time into a plurality of time slots-, displaying on the display screen a first row of at least one colored cell wherein the length of each colored cell corresponds to a length of time and the color of the colored cell corresponds to a status; displaying on the display screen a first column of at least one colored cell, the first column of at least one colored cell is a queue for the corresponding period of time wherein each cell in the first column is an element in the **queue** ; and **displaying** a color legend on the display screen, the color legend associates each status with a unique color.

43 The method as defined in Claim 42 further comprising the act of displaying an **appointment** status in response to an instantiation of the cell.

44 The method as defined in Claim 42 further comprising the act of displaying an **appointment** -scheduling window in response to an instantiation of the cell.

45 The method as defined in Claim. 42, wherein the delineation of the period of time is a plurality of hours in a day. - The method as defined in Claim 42, wherein each colored cell corresponds to a time slot. 47- The method as defined in Claim 42 further comprising the acts of displaying a services offered legend on the display screen, the services offered legend lists one or more services offered; and indicating which one of the one or more services offered has been scheduled.

48 The method as defined in Claim 42 further comprising the act of

indicating all appointments made with a professional subscriber in response to receiving the request to 1 0 display the multi-dimensional calendar object from the professional subscriber. . 49. The method as defined in Claim 42 further comprising the act of only indicating appointments made by a user with a professional subscriber in response to receiving the request to display the multi-dimensional calendar object from the user.

50 The method as defined in Claim 49, wherein cells representing appointments scheduled by other users are indicated as not available for **schedule** .

51 The method as defined in Claim 42 further comprising the act of displaying a confirmation window in response to an instantiation of the cell, the confirmation window is used to confirm a scheduled **appointment** .

52 The method as defined in Claim 42 further comprising the act of displaying an **appointment** status window in response to an instantiation of the cell, the **appointment** status window is used to cancel a scheduled **appointment** .

53 A method of accessing an **appointment** scheduling system which generates a multi-dimensional calendar, the **appointment** scheduling system is implemented on a first web site, the method comprising the acts of receiving a request to access the **appointment** scheduling system, the request

is received from a web page in a second web site;
retrieving one or more items of calendar attributes from a database implemented on a computer readable storage medium;
analyzing the one or more items of calendar attributes; and
generating a multi-dimensional calendar object having a plurality of cells in a first row and a plurality of cells in a first column wherein each of the plurality of cells in the first row corresponds to a time slot and each of the plurality of cells in the first column corresponds to an element in a **queue** .

- An **appointment** scheduling system which generates a multi-dimensional calendar to facilitate the scheduling of appointments, the **appointment** scheduling system comprising:

a means for receiving a plurality of calendar attributes from a professional subscriber;

a means for storing the plurality of calendar attributes; and

a means for generating a multi-dimensional calendar object by evaluating at least one of the plurality of calendar attributes, the multi-dimensional calendar object comprising a grid-like arrangement of a plurality of cells, the grid-like arrangement comprises a horizontal alignment of one or more cells wherein each of the one or more cells in the horizontal alignment is associated with a time slot, the grid-like arrangement comprises a vertical alignment of one or more cells wherein each of the one or more cells in the vertical alignment is a **queue** element in the associated time slot; and

1 5 a means for associating a status with each of the plurality of cells in the grid-like arrangement, the status is indicated by cell color.

55 The system as defined in Claim 54 further comprising a means for

receiving a request to display the multi-dimensional calendar object.
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